Water Quality Standards

2005 Triennial Review

Overview

Overview

- Triennial Review Summary
- Water quality standards
  - EPA 304(a) criteria development
  - Adopted as Montana standards
- Public outreach effort

What are Water Quality Standards?

- Designated Uses
  - Human Health
  - Aquatic Life
- **Criteria to protect uses (MT Standards)**
  - **Numeric**
    - **DEQ-7**
  - Narrative
- Antidegradation Policy

ARM 17.30.5,6 & 7 Proposed Changes

- General clean up
- Fecal Coliform changed to *E. coli*
- Mixing zone formula correction
- ORW's
  - Definition change
  - Clear place holder
- WQB-7 (DEQ-7) (incorporated by reference)

Bacteria: Fecal Coliform to *E. coli*

- Provide protection for contact recreation use
- Better indicator of potential for disease
- Level of protection generally unchanged
  - Secondary standard for off-season protection
  - Primary standard for warm season (4/1 through 10/31) rather than water temperature
    - To facilitate interpretation

Mixing Zone Formula ARM 17.30

- Current: $A/2 = [0.4(W/2)^2V]/L$
- Current: $A/2 = [0.4(200/2)^2 1]/10$
- $A/2 = 400$

- Proposed: $A/2 = [(W/2)^2V] /2\pi L$
- Proposed: $A/2 = [(200/2)^2 1] /2\pi 10$
- $A/2 = 159$

Outstanding Natural Resource Waters

- This classification provides the highest level nondegradation protection
  - No discharges of pollutants
- Provide “place holder” for any new designations, e.g. Gallatin River

WQB-7 (DEQ-7) Proposed Changes

- Intro & footnotes revised to improve clarity
- Standardize hardness-dependent metals values to 25 mg/l
- **Arsenic HH WQS to 10 ug/l**
- **Update numeric standards to be consistent with current EPA 304(a) Criteria (92 parameters)**
- **Groundwater HH WQS changes**
- Incorporation of advances in science
  - 23 Required Reporting Values (RRV) changed to reflect improvements in lab detection limit capability
  - Polycyclic Aromatic Hydrocarbons (PAHs) method
  - Dioxin method
  - Fecal Coliform changed to E. coli

Arsenic HH WQS
(carcinogen)

- Level of protection specified in MCA
  - More restrictive of
    - 1 in 1,000 risk of cancer
    - MCL (Safe Drinking Water Act)
  - Current HH WQS 18 ug/l
  - New MCL of 10 ug/l in effect 1/23/06

State options for setting standards to protect benefical uses
(40 CFR 131.11)

- Numeric standards be based on:
  - 304(a) guidance
    - Published by EPA
  - 304(a) guidance modified to reflect site-specific conditions
  - Other scientifically defensible methods
- Narrative where numeric cannot be determined

Numeric Standards

Aquatic Life Criteria

Aquatic life standards considerations

- Develop both acute and chronic standards
- Ionizable forms of chemical require separate standards where possible, e.g. Cr III and Cr VI
- Toxicity of many substances varies with other water chemistry parameters
  - NH with pH & temperature
  - metals with hardness

Aquatic Life Standard Development

- Acute or Criterion Maximum Concentration (CMC)
- Toxicity Tests
  - Lethal Concentration (LC-50) or
  - Effective Concentration (EC-50)
    - 96 hour tests (short term)

Aquatic Life Standard Development

- Chronic or Criterion Continuous Criteria (CCC)
  - 30 days or longer toxicity tests
  - life cycle tests
  - early life stages included
- Impacts Considered
  - growth rate
  - reproduction
  - other non-lethal affects (abnormalities)

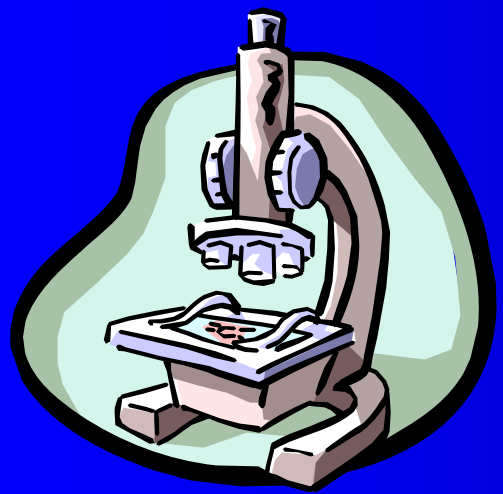
Toxicity Test Minimum Dataset for Freshwater Aquatic Life

- 8 different taxa minimum
- 8 families
  - Salmonid
  - Non-salmonid fish
  - Other chordate
  - Planktonic crustacean
  - Benthic crustacean
  - Insect
  - Rotifer, annelid or mollusc
  - Other insect or mollusc
- Should include a commercially or recreationally important fish
- Consider most sensitive life stages

National Criteria Development

Human Health Criteria

Carcinogens and Non-Carcinogens



Human Health Standards

- Highest concentration of pollutant not expected to pose a significant risk to health

Types of Effects

- Non-threshold
  - Carcinogens, assume linear response
- Threshold
  - Toxics
- Organoleptic effects
  - Taste, odor, color
  - “Harmful”

Human Health Criteria

Toxics

- A Single value
- Long-term
  - 70-year lifetime exposure
- Multi-routes of Exposure
  - 2 liters of water per day
  - Now 6.5 g of fish (2002 EPA 17.5 g)
    - Biomagnication
- Reference dose (RfD)
  - no-observed-adverse-effect-level”
  - an extrapolation of animal and other biomedical studies
  - an estimate of the daily dose without appreciable risk of deleterious effects (threshold effect)
  - Available from Integrated Risk Information System (IRIS)

National Criteria Development Human Health Standards

Carcinogens

- Considerations
  - Cancer Potency
  - Exposure
  - Risk

National Criteria Development Human Health Standards

Carcinogens

- Potency
  - No Threshold Level
    - Any exposure has some level of increased risk
  - Estimates Based on Human (limited) and Animal Data
  - Extrapolation from High-dose to Low-dose
  - Cancer Potency Estimates (q_1*) are in IRIS

National Criteria Development Human Health Standards

Carcinogens

- Exposure
  - Lifetime, 70-years
  - 2 Liters of Water per Day
  - Now based on 6.5g of Fish per Day
    - 2002 EPA 17.5 g of fish/day

National Criteria Development Human Health Standards

Carcinogens

- Risk
  - Montana Water Quality Act Excess Risk Levels
    - Most protective of:
      - 1/100,000 (Except Arsenic at 1/1,000)
      - Federal MCL (Safe Drinking Water Act)

Outreach

- Website
- Public meeting (10 August)
  - Approximately 800 postcards sent
  - 5 attendees
  - RRV feedback
- WETA (12 August)
- Additional effort on Fecal Coliform

Significant issues raised by the public:

- RRV's
- Fish consumption levels
  - DEQ going forward with 17.5 g/d
    - Reasonably protective and in line with other states
    - Do not want to further delay this rulemaking
    - Resource commitment
    - Will further consider development of MT value

EXTRA Slides

Federal Promulgations (40 CFR 131.22)

- If EPA disapproves AND
- If state or tribe does not adopt the specified changes within 90 days...
- THEN the EPA Administrator must promptly propose and promulgate a replacement standard (CWA Section 303 (c) (4)(A))
- OR in any case where the Administrator determines new or revised standards are necessary to meet the requirements of the CWA (CWA Section 303 (c) (4)(B))

The EPA Considers Montana's WQ Standards to be the:

Water Quality Act,
Administrative Rules of Montana,
Mixing Zone Rules,
Surface Water Quality Standards and Procedures,
Non-degradation Rules, and
WQB-7

These include a mix of narrative (…to be maintained free from…) and numeric (10µg/L) "standards."

Administrative Rules of Montana (ARM)

- Puts the WQA (and other Legislation) into Action
- Title 17, Chapter 30,
  - Subchapter 5 - Mixing Zone Rules
  - Subchapter 6 - Surface Water Quality
  - Subchapter 7 - Nondegradation Rules
  - Subchapter 10 - Ground Water Pollution Control System
  - Subchapter 11- Stormwater Rules
  - Subchapters 12-13 Montana Pollutant Discharge Elimination System

Department Circulars

Circular DEQ 1 - Standards for Water Works

Circular DEQ 2 - Design Standards for Wastewater Facilities

Circular DEQ 3 - Standards for Small Water Systems

Circular DEQ 4 - Montana Standards for On-Site Subsurface Sewage Treatment Systems

Circular DEQ 8 - Montana Standards for Subdivision Storm Drainage, 2002 edition

Circular DEQ 11 - Montana Standards for Development of Springs for Individual and Shared Non-Public Systems

Circular DEQ 17 - Montana Standards for Cisterns (Water Storage Tanks) for Individual Non-Public Systems

More, Department Circulars

Circular PWS 1 - Standards and Monitoring Requirements for Volatile Organic, Inorganic, and Synthetic Organic Chemicals

Circular PWS 2 - Public Notification Requirements for Public Water Supply System Suppliers

Circular PWS 3 - Criteria to Avoid Filtration of a Surface Water Source or a Groundwater Source Under the Direct Influence of Surface Water.

Circular PWS 4 - Requirements for the Control of Lead and Copper

Circular PWS 5 - Groundwater under the Direct Influence of Surface Water

Circular PWS 6 - Source Water Protection Delineation

More, Department Circulars

Circular WQB-7 - Montana Numeric Water Quality Standards (BER adopted)

Safe Drinking Water Act

- Maximum Contaminant Level (MCL)
  - Human Health, risk based
  - considers treatment cost and technology
  - applies to distribution system water

The Department of Environmental Quality's mission is to protect, sustain, and improve a clean and healthful environment to benefit present and future generations.

Federal & State roles

- Federal Clean Water Act
  - EPA
    - develops criteria for aquatic life and human health
    - Final approval authority for state standards
  - States - designate uses and adopt standards
- Montana Water Quality Act
  - Enacted by Montana legislature
  - Provides Montana the authority to implement Federal CWA provisions
  - ARM - provides detail
    - Board of Environmental Review
      - Adopts standards after a public involvement process
    - Surface Water Quality Classifications & Standards

Water Quality Standard Example

- Beneficial Use: Agriculture
- Numeric standard for SAR in Tongue River during irrigation season is monthly average of 3 and no sample may exceed 4.5
- Nondegradation Policy: "Changes in…..water quality….with respect to EC and SAR….are considered nonsignificant….provided the change will not have a measurable effect….on any….use or cause measurable changes in aquatic life or ecological integrity." (ARM 17.30.670(6))

Acute & Chronic Standards

- "Criterion Maximum Concentration"
  - CMC
  - Highest concentration of a toxicant to which an organism can be exposed for **a brief period of time** without an unacceptable **acute** effect, e.g. death
  - **Acute**
- Criterion Continuous Concentration
  - CCC
  - Highest concentration of a toxicant to which an organism can be exposed for **longer time periods** without an unacceptable **adverse** effect, e.g. death
  - **Chronic**